

Course Outline

COURSE: WTRM 107 **DIVISION:** 50 **ALSO LISTED AS:**

TERM EFFECTIVE: Fall 2018 **Inactive Course**

SHORT TITLE: BEG WASTEWATER TRT OPS

LONG TITLE: Beginning Wastewater Treatment Operations

| Units | Number of Weeks | | Contact Hours/Week | | Total Contact Hours |
|-------|-----------------|----------|--------------------|----------|---------------------|
| 3 | 18 | Lecture: | 3 | Lecture: | 54 |
| | | Lab: | 0 | Lab: | 0 |
| | | Other: | 0 | Other: | 0 |
| | | Total: | 3 | Total: | 54 |

COURSE DESCRIPTION:

This course covers an introduction to the operations and maintenance of a wastewater treatment facility. Topics include industry careers, certifications, advanced wastewater treatment methods, valves and equipment, as well as industry standard math formulas and conversion factors. This course is now listed as WTRM 207. **ADVISORY:** Eligible for Math 205.

PREREQUISITES:

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES

L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

02 - Lecture and/or discussion

STUDENT LEARNING OUTCOMES:

1. Describe how to engage in industry networking; list industry acronyms; discuss career opportunities; identify state and voluntary certifications and their issuing organizations; and describe the application of basic math in wastewater treatment.

Measure of assessment: Exams, homework problems

Year assessed, or planned year of assessment: Fall 2016

2. Explain the basics of wastewater treatment, including the characteristics of wastewater, wastewater collection systems. and associated basic math.

Measure of assessment: Exams, homework problems.

Year assessed, or planned year of assessment: Fall 2016

3. Define the differences between preliminary treatment and primary treatment.

Measure of assessment: Exams

Year assessed, or planned year of assessment: Fall, 2016

4. Explain critical biological concepts, including those associated with pond and lagoons.

Measure of assessment: Exams

Year assessed, or planned year of assessment: Fall, 2016

5. Discuss secondary treatment, fixed film processes, trickling filters and rotating biological contactors.

Measure of assessment: Exams

Year assessed, or planned year of assessment: Fall, 2016

6. Describe secondary treatment, suspended film processes, activated sludge, combined processes and trickling filter solids contact.

Measure of assessment: Exams, homework problems

Year assessed, or planned year of assessment: Fall, 2016

7. Describe the processes for the disinfection of wastewater, including thickening of sludge solids.

Measure of assessment: Exams, homework problems

Year assessed, or planned year of assessment: Fall, 2016

8. Describe the components of sludge digestion, including aerobic digestion, anaerobic digestion, sludge processing, bio-solids processing and bio-solids disposal.

Measure of assessment: Exams, homework problems

This section does not contain any data.

9. Explain final effluent disposal, including secondary and tertiary effluent.

Measure of assessment: Exams, homework problems

This section does not contain any data.

10. Describe the roles of laboratory sampling and testing, as well as facility and equipment maintenance and safety in wastewater plant operations.

Measure of assessment: Exams, homework problems

Year assessed, or planned year of assessment: Fall, 2016

CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS

Inactive Course: 11/13/2017

2 Hours

Content: Instructor and Student Introductions and Networking. Acronyms throughout the Industry. Career Opportunities. State and Voluntary

Certifications and their Issuing Organizations. Overview of Wastewater Treatment. Basic Math.

Student Performance Objectives (SPO): Discuss Networking Potential. Define Industry Standard Acronyms.

Recognize Professional Organizations and the Certifications Offered. Outline State Organizations and the Certifications Offered. Identify Career Opportunities Locally, Statewide, and Nationally.

Explain Industry Standard Basic Math Formulas and Conversions.

Out-of-Class Assignments: For each topic, students will review in class, and text book examples to complete hand-out homework

assignments.

6 Hours

Content: Introduction to Wastewater Treatment. Characteristics of Wastewater. Wastewater Collection Systems. Basic Math.

Student Performance Objectives (SPO): Define and

discuss Pre Treatment, Primary Treatment, Secondary Treatment, Tertiary Treatment Stages. Explain the Different Types and Characteristics of Wastewaters. Describe Types of Collection Systems and Manhole Placement Requirement. Calculate Areas and Volumes. Convert Cubic Feet to Gallons to Pounds. Calculate Linear Feet Measurements, Perimeters, and Circumference. Explain the Pounds Formula.

Calculate Velocity.

Out-of-Class Assignments: For each topic, students will review in class, and text book examples to complete hand-out homework assignments.

6 Hours

Content: Preliminary

Treatment. Primary Treatment. Basic Math.

Student Performance Objectives (SPO): Describe Pretreatment Equipment and Functions. Understand the Different Stages and Need for Pretreatment. Identify

Primary Treatment Equipment and Functions. Recognize Removal Efficiencies for Primary Treatment. Define Basic Primary Treatment Operation. Calculate Surface Loading Rates. Calculate Surface and Wier Overflow Rates. Calculate Detention Time.

Out-of-Class Assignments: For each topic, students will review in class, and text book examples to complete hand-out homework assignments.

6

Hours

Content: Biological Concepts. Pond and Lagoons. Basic Math.

Student Performance Objectives (SPO): Outline the Key Biological Actions in Wastewater Treatment. Identify the Common Types of

Bacteria in the Various Biological Processes. Recognize how Temperature, pH, and Dissolved Oxygen Affect Biological Processes. Identify the Various Types of Ponds Used. Describe Parameters of Pond Classification. Describe Operational Controls of the Different Classification of Ponds. Calculate Hydraulic and Organic Loading to the Ponds. Calculate Pond Evaporation Rate. Convert Temperature from Degrees Fahrenheit to Centigrade, and from Degrees Centigrade to Fahrenheit.

Out-of-Class Assignments: For each topic, students will review in class, and text book examples to complete hand-out

homework assignments.

3 Hours

Content: Secondary Treatment. Fixed Film Processes. Trickling Filters. Rotating Biological Contactors. Basic Math.

Student Performance Objectives (SPO): Outline

the Various Fixed Film Secondary Treatment Processes. Describe the Main Parts of a Trickling Filter. Identify the Main Parts of a Rotating Biological Contactor. Explain Performance Limits.

Identify Types of Bacteria in the Bio-Mass. Discuss Sloughing (life) Cycles of the Bio-Mass. Calculate Hydraulic Loading and Organic Loading for the Various Fixed Film Processes.

Out-of-Class

Assignments: For each topic, students will review in class, and text book examples to complete hand-out homework assignments.

3 Hours

Content: Secondary Treatment. Suspended Film Processes.

Activated Sludge. Combined Processes. Trickling Filter Solids Contact. Basic Math.

Student Performance Objectives (SPO): Identify and explain the Many Activated Sludge Processes. Understand

Performance Limits. Identify the Types of Bacteria in Activated Sludge. Explain Aeration Types and Requirements. Outline Return and Wasting Requirements. Define Mass Balance. Explain the Principles of the Combined Trickling Filter Solids Contact Process. Calculate Hydraulic Loading and Organic Loading for the Various Activated Sludge Processes. Calculate Sludge Age, SVI, MCRT, Pounds to Return, and Pounds to Waste.

Out-of-Class Assignments: For each topic, students will review in class, and text book examples to complete hand-out homework assignments.

6 Hours

Content:

Disinfection of Wastewater. Thickening of Sludge Solids. Basic Math.

Student Performance Objectives (SPO): Identify the Disinfection Methods Used in the Wastewater Industry. Identify the Equipment

Used by Different Disinfection Processes. Discuss the 3 Forms of Chlorine Widely Used (Gas, Liquid, Dry) Explain the Safe Handling and Use of Chlorine and Personal Protection Equipment Required.

Explain the Purpose for Chlorine Contact Time. Identify the Various Methods of Sludge Thickening. Describe the Various Types of Sludge to be Thickened. Calculate Thickened Sludge Feed Rates.

Calculate Pounds of Chlorine Needed based on Percent Strength of the Chlorine Used (Gas, Liquid, Dry) Manipulate Dose, Demand, and Residual Formulas.

Out-of-Class Assignments: For each topic,

students will review in class, and text book examples to complete hand-out homework assignments.

6 Hours

Content: Sludge Digestion. Aerobic Digestion. Anaerobic Digestion. Sludge Processing.

Biosolids Processing. Biosolids Disposal. Basic Math.

Student Performance Objectives (SPO): Describe the Various Sludge Digestion Processes. Outline the Aerobic Sludge Digestion Process. Describe

the Anaerobic Sludge Digestion Process. Identify the Equipment Used and Operational Controls of Aerobic and Anaerobic Sludge Digestion. Discuss Sludge Stabilization and Digestion By-Products.

Discuss the Main Safety Concerns Regarding Anaerobic Digestion. Calculate Volatile Solids Loading. Calculate Percent Reduction of Volatile Solids. Calculate Pounds of Methane Gas Produced per Pound of Volatile Solids Destroyed.

Out-of-Class Assignments: For each topic, students will review in class, and text book examples to complete hand-out homework assignments.

6 Hours

Content: Final

Effluent Disposal. Secondary Effluent. Tertiary Effluent. Basic Math.

Student Performance Objectives (SPO): Describe the Various Effluent Disposal Methods. Identify Acceptable Disposal Methods

for Secondary and Tertiary Effluents. Describe the Various Types of Equipment used for Effluent Discharge. Explain Effluent Reuse Requirements. Calculate Chlorine Disinfection Rates and

Dechlorination Dosing Rates. Calculate Percent (%) Removal/Efficiency.

Out-of-Class Assignments: For each topic, students will review in class, and text book examples to complete hand-out homework

assignments.

6 Hours

Content: Laboratory Test. Sampling. Maintenance. Safety. Record Keeping.

Student Performance Objectives (SPO): Identify and describe the Various Laboratory Tests Performed for Process Control and Regulatory Reporting Requirements. Explain the Measurement of pH and what Each End of the Scale Represents. Outline How BOD, Total Solids, Settleable Solids, Volatile Solids, Coliform Concentration, Turbidity, Volatile Acids/Alkalinity, Methane Content, Priority Pollutants, and Metals Analysis are used in the Operation of a Wastewater Treatment Facility. Discuss the Many Safe Practices Involved in the Successful Operation of the Facility. Identify Maintenance Needs. Explain the Difference Between Preventive Maintenance and Predictive Maintenance. Describe the Importance of Record Keeping and Log Books.

Out-of-Class Assignments: For each topic, students will review in class, and text book examples to complete hand-out homework assignments.

2 Hours

METHODS OF INSTRUCTION:

Lecture and discussion Visual Aids Demonstrations Facilities Tours (as available) Class Participation
Quizzes In class worksheets Exams Homework

METHODS OF EVALUATION:

Writing assignments

Percent of total grade: 10.00 %

Percent range of total grade: 10 % to 20 % Written Homework Other: In Class Worksheets

Problem-solving assignments

Percent of total grade: 40.00 %

Percent range of total grade: 40 % to 60 % Homework Problems Quizzes Exams Other: In Class
Worksheets

Skill demonstrations

Percent of total grade: 0.00 %

Percent range of total grade: 0 % to 10 % Class Performance/s

Objective examinations

Percent of total grade: 40.00 %

REPRESENTATIVE TEXTBOOKS:

Required Representative Textbooks

Division of Water, Bureau of Water Compliance. Manual of Instruction for Wastewater Treatment Plant
Operators - 2 Volume Set, or other appropriate college level text.. Syracuse, NY: New York State
Department of Environmental Conservation,2011.

Reading Level of Text, Grade: 11th Verified by: Dana Young

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:

CSU GE:

IGETC:

CSU TRANSFER:

Transferable CSU, effective 201230

UC TRANSFER:

Not Transferable

SUPPLEMENTAL DATA:

Basic Skills: N

Classification: Y

Noncredit Category: Y

Cooperative Education:

Program Status: 1 Program Applicable

Special Class Status: N

CAN:

CAN Sequence:

CSU Crosswalk Course Department: WTRM

CSU Crosswalk Course Number: 107

Prior to College Level: Y

Non Credit Enhanced Funding: N

Funding Agency Code: Y
In-Service: N
Occupational Course: C
Maximum Hours: 3
Minimum Hours: 3
Course Control Number: CCC000529233
Sports/Physical Education Course: N
Taxonomy of Program: 095800